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EXAMINER

PHAM, HAI CHI

| ART UNIT | PAPER NUMBER |
|----------|--------------|
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2861

DATE MAILED: 12/20/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/749,541

Applicant(s)

MAEDA, KATSUHIKO 

Examiner

Hai C Pham

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 25 September 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 15-90 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 15-42, 47, 48 and 64-79 is/are rejected.
- 7) ☒ Claim(s) 43-46, 49-63 and 80-90 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3, 7.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## DETAILED ACTION

### *Election/Restrictions*

1. Although the claims are directed to different species, they do not however show a separate status in the art and there is no unduly extensive and burdensome search being required. Accordingly, the restriction requirement as to the encompassed species is hereby withdrawn and claims 36-42, 66, 67, 78-83, and 85, directed to the species of II no longer withdrawn from consideration.

### *Priority*

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### *Claim Objections*

3. The following claims are objected to because of the following informalities:

#### Claim 26:

- Lines 3-4, "by changing the prescribed write clock frequency" should read --by changing the plurality of prescribed write clock frequencies-- since there are a plurality of light beam generating devices.

#### Claim 27:

- Line 2, "charged" should read --changed--.

#### Claim 28:

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- Line 2, "charged" should read --changed--.

Claims 43 and 44:

- Claim 44 should claim dependency from claim 16 only because the following limitation "lowering a light beam deflection speed of said at least one light beam deflecting device" (emphasis added) would make the dependency of claim 44 from claim 15 improper. Claim 43 should then claim dependency from claim 15 only after amending claim 44 as it is suggested above to avoid duplication.

Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 15, 17/15-19/15, 20, 21/15, 22, 25, 27, 29, 31, 33, 35/15, 47, 64, 68, 70, 72, 74, 76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamakawa et al. (U.S. 5,610,651) in view of Sakurai (JP 10-136171).

Yamakawa et al. discloses a magnification error correcting method for an image forming apparatus, the image forming apparatus including a light beam generating device (laser diode 101) configured to generate a light beam, a light beam modulating device (laser driving circuit 109) configured to modulate the light beam in accordance with an Image signal at a prescribed write clock frequency (CLK, Fig. 1), a light beam

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deflecting device (rotational polygon mirror 102) configured to rotate by a prescribed rotation number and deflect the light beam so as to scan an image carrier (drum 103) in a main scanning direction, a pair of light beam detecting devices (105 and 106) configured to detect the light beam, said pair of light beam detecting devices being separately positioned in the main scanning direction (Fig. 1), a time difference determining device (write clock generating circuit 107, Fig. 2) configured to determine a time period (scanning time  $T_1$ ) elapsing from when the light beam is detected by a first of said pair of light beam detecting devices to when the light beam is detected by a second of said pair of light beam detecting devices, said time difference determining device generating a time difference signal at an optional timing of image formation, a comparing device configured to compare the time difference signal with a reference time difference signal (basic scanning time  $T_d$ ) representing preferable magnification so as to recognize magnification error of the light beam in the main scanning direction, a magnification correcting device configured to correct the magnification error by changing the prescribed write clock frequency ( $f_0$ ) to prescribed level based on a result of a comparison between the time difference signal and the reference time difference signal by said comparing device.

Although, Yamakawa et al. recognizes that the change of the scanning speed (rotating speed of the polygon mirror) due to a change in temperature inside the optical scanning apparatus affects the magnification in the main scanning direction (col. 2, line 66 to col. 3, line 13), Yamakawa et al., however, fails to teach the magnification error

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correction including changing the prescribed rotation number of the light beam deflecting device.

Regardless, Sakurai discloses a method for correcting the magnification error in the direction of main scanning by changing both the number of revolutions of the polygon mirror and the write clock of the laser diode based on the magnification adjustment data (see Abstract).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to incorporate the adjustment of the number of rotation of the light beam scanner in addition to the change of the write clock frequency as taught by Sakurai in the device of Yamakawa et al. By doing so, it is possible to control the magnification error caused by the fluctuation in the scanning speed due to environmental temperature.

On the other, although Yamakawa et al. does not explicitly disclose a visualizing device configured to visualize an image formed on the image carrier, it is however well known in the art of laser printing that a developing device is commonly used to develop the latent image formed on the photosensitive drum. In other words, the visualization device is an inherent part of an optical scanning device.

Yamakawa et al. further discloses:

- the magnification correcting device continuously correcting the magnification errors until a time difference indicated by the time difference signal substantially accords with the reference time difference indicated by the reference time difference signal,

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- the prescribed levels being obtained from a magnification correction table (initial magnification adjustment write clock frequency or initial write clock frequency being stored in memory, not shown),
- each of the prescribed levels corresponds to an amount of time difference (T1),
- the magnification errors being sufficiently corrected by changing the prescribed write clock frequency,
- said magnification correcting device changing the prescribed write clock frequency after initializing a current rotation number of said light beam deflecting device and a new time difference signal being generated and compared with the reference time difference signal (step S412, Fig. 4),
- an image write start position adjusting device configured to adjust an image write start position of the light beam in the main scanning direction on the image carrier in accordance with the time difference signal (the first laser beam detecting sensor 105 being also used as a synchronism detecting sensor),
- said light beam deflecting device includes a polygon mirror.

6. Claims 16, 17/16-19/16, 21/16, 23, 24, 26, 28, 30, 32, 34, 35/16, 48, 65, 69, 71, 73, 75, 77 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishigami et al. (U.S. 5,933,184) in view of Yamakawa et al. and Sakurai.

Ishigami et al. discloses a color image-forming device in which the distortion in expansion or contraction of the latent image (magnification error) in the main scanning direction is corrected by generating image clock pulses with periods corresponding to

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the stored correction data. Ishigami et al. further teaches the color image forming device comprising a plurality of sets of optical scanning devices, each of which comprises a laser light source (5), a rotary polygon mirror (6), and the magnification error correction being applied to each of the sets of optical scanning devices such that the registration of the multiple mono color images are ensured. Ishigami et al. also discloses a visualizing device (developer 14) configured to visualize the image formed on the image carrier or photosensitive body (4).

However, Ishigami et al. fails to teach the use of a pair of photosensors for detecting a time difference between the output signals of the photosensors and the magnification error correction being provided by the rotation number of the light beam deflecting device along with the above changing of the write clock frequency to prescribed levels.

Nevertheless, Yamakawa et al. discloses a magnification error correcting method for an image forming apparatus, which uses a pair of photosensors to detect a time difference between the output signals of the photosensors, and changes the write clock frequency in accordance with the measured time difference.

On the other hand, Sakurai discloses a method for correcting the magnification error in the direction of main scanning by changing both the number of revolutions of the polygon mirror and the write clock of the laser diode based on the magnification adjustment data.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify the device of Ishigami et al. with the



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aforementioned teachings of both Yamakawa et al. and Sakurai. By doing so, it is possible to improve the correction of the magnification error caused by the fluctuation in the scanning speed.

7. Claims 36-38, 66, 78 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kanai et al. (U.S. 5,450,211) in view of Sakurai (JP 10-136171).

Kanai et al. discloses an image forming apparatus and method in which the magnification error in the main scanning direction is corrected by using a temperature sensor (28) for sensing the temperature around the f- $\theta$  lenses (16 and 17) (col. 10, lines 22-68), and the correction being made by changing the write frequency of the laser diode (via frequency divider).

However, Kanai et al. fails to teach the correction of the magnification error being performed by changing the rotation number in addition to the above changing of the write clock frequency to prescribed levels in accordance with the detected temperature. Kanai et al. also discloses a developing unit (33) for visualizing an image formed on the image carrier.

Regardless, Sakurai discloses a method for correcting the magnification error in the direction of main scanning by changing both the number of revolutions of the polygon mirror and the write clock of the laser diode based on the magnification adjustment data (see Abstract).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to incorporate the adjustment of the number of rotation of

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the light beam scanner in as well as the change of the write clock frequency as taught by Sakurai in the device of Yamakawa et al. By doing so, it is possible to control the magnification error caused by the fluctuation in the scanning speed due to environmental temperature.

8. Claims 39-42, 67, 79 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishigami et al. in view of Kanai et al. and Sakurai.

Ishigami et al. discloses a color image forming device having a plurality of sets of optical scanning devices in which the distortion in expansion or contraction of the latent image (magnification error) in the main scanning direction in each of the sets is corrected by generating image clock pulses with periods corresponding to the stored correction data.

However, Ishigami et al. fails to teach using the temperature sensor for sensing the temperature of the imaging lenses and the correction of the magnification error being based on such detection.

Nevertheless, Kanai et al. discloses an image forming apparatus and method in which the magnification error in the main scanning direction is corrected by using a temperature sensor (28) for sensing the temperature around the f- $\theta$  lenses (16 and 17), and the correction being made by changing the write frequency of the laser diode (via frequency divider).

On the other hand, Sakurai discloses a method for correcting the magnification error in the direction of main scanning by changing both the number of revolutions of the

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polygon mirror and the write clock of the laser diode based on the magnification adjustment data.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify the device of Ishigami et al. with the aforementioned teachings of both Kanai et al. and Sakurai. By doing so, it is possible to control the magnification error caused by the fluctuation in the scanning speed due to environmental temperature.

***Allowable Subject Matter***

9. Claims 43-46, 49-63, 80-90 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. The following is a statement of reasons for the indication of allowable subject matter: none of the prior art made of record discloses or fairly suggests the claimed limitation related the correction of the magnification error in the main scanning direction in which the correction is performed by changing the rotation number of the light beam deflecting device along with the change of the write clock frequency, and wherein the correction processing starts either with the light beam deflecting device speed being lowered to a low speed (claims 43-46, 49-58, 80-85), or without the light beam deflecting device speed being lowered to a low speed (claims 59, 60, 86, 87), or in accordance with the interval of sheets fed to the image carrier (claims 61-63, 88-90).

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***Conclusion***

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Shimada (JP 61-32029) Shimada discloses a method for correcting the magnification error in the direction of main scanning by changing the number of revolutions of the hologram scanner.

***Contact Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hai C Pham whose telephone number is (703) 308-1281. The examiner can normally be reached on T-F (8:30-5:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin R. Fuller can be reached on (703) 308-0079. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722, (703) 308-7724, (703) 308-7382, (703) 305-3431, (703) 305-3432 for regular communications and for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.



**HAI PHAM  
PRIMARY EXAMINER**

December 18, 2002